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CHAPTER SEVENTEEN:

SEEDING

Seeding is considered a beautification process and often is the last item of the contract to be completed. However, beautification is the secondary purpose for seeding. The primary purpose of seeding is erosion control. Erosion control is done by scheduling seeding and sodding operations as early as possible. Stage seeding should also be done. Large cut and fill slopes are required to be seeded as soon as they are finished. Seeding for the prevention of soil erosion is not only one of the major items in road construction, but is also an important maintenance factor.

The technician is required to inspect all seeding operations to insure the correct quantities, proper mixing of seed, and correct preparation of the seed bed.

TYPES OF SEEDING

The two types of seeding are plain seeding and mulched seeding. The only difference between these two types is that mulching material is placed on the areas where necessary for mulched seeding. The amount of seed and fertilizer and method of preparation and placement for the two kinds of seeding are the same. Plain seeding is seldom used.

PREPARATION

Prior to the placement of seed, the soil is required to be prepared. The preparation allows the seed to readily attach the root system to the soil. A seed may sprout laying on a large rock but will not continue to grow without a root system. The area to be seeded is required to be:

- 1) In accordance with the required cross section and finished grade
- 2) Made smooth and uniform
- 3) Loosened to a minimum depth of 3 in.
- 4) Covered with top soil, if required

APPLICATION RATE OF FERTILIZER

After the soil is prepared, fertilizer is spread uniformly over the area at the rate of 800 pounds per acre. Fertilizer applied with hydro-seeders is done with a minimum of 500 gallons of water per acre. This procedure yields a visual means of inspection for an even distribution and insures a dampening effect which begins the release of the fertilizer chemicals into the soil.

Some Contractors may experience difficulty in obtaining the specified 12-12-12 fertilizer and may request substitutes. These substitutes may be approved upon written request. The substitute is required to contain balanced ingredients such as 10-10-10. The application rate, however, is required to be adjusted to compensate for this change. All fertilizer is based on the 800 pound per acre for seeding and 400 pounds per acre under sod.

A change from 12-12-12 to 10-10-10 would mean the application of 12/10 x 800 or 960 pounds per acre. However, only 800 pounds would be paid for. Accurate records are required to be maintained of all the fertilizer used and recorded in the contract records. The computations converting the total actual quantity used to equivalent tons of 12-12-12 are required to be shown in the final construction record.

APPLICATION OF SEED

Seed may be drilled into the ground; however, the seed may not be covered by more than 1/2 in. The seed may also be mixed with water and sprayed over the area to be seeded. This is referred to as hydro-seeding. Hydro-seeding allows the Contractor to reach areas often inaccessible with seed drilling devices. There may still be other inaccessible small areas that require seeding with a hand-operated cyclone seeder. The cyclone seeder may also be used where the area to be seeded is small. For example, seeding around new luminaire bases when the balance of the area is already established may require a cyclone seeder.

Leguminous seeds, unless otherwise specified, are required to be inoculated with a culture. These are seeds that belong to the pea plant family. Such legumes as peas, beans, and peanuts do not make good roadway vegetation; however, alfalfa, clover and vetch do. Their purpose is as follows:

- 1) The massive root system helps prevent future erosion of embankments
- 2) The biological activity is important

- 3) Taking nitrogen from the air and changing the nitrogen into forms that may be used by other plants

The culture is a nitrogen fixing bacteria that enhances the germination of the seed. The culture (inoculant) is mixed with sufficient water to distribute the material thoroughly. The seed is wetted thoroughly with the solution. Once the inoculation is complete the seed is allowed to dry sufficiently. The inoculated seed is sown within 30 hours after the treatment. Often the legumous seeds are hydraulic applied. If so, the inoculant may be added to the water in the spray tank. The amount of inoculant is required to be two times the manufacturer's recommendations and the inoculant is not used if more than one year old.

Seeding is usually indicated by a "Seed Mixture Type" item in the contract. A contract may have several different types of seed mixtures. Where the different mixtures are placed, the type of seed mixtures to be used and the proposed rate of application of each mixture are items the technician is required to know.

The type of seed is normally only indicated in the Proposal quantity items. Occasionally, the type is found on the plans if differing types are to be used. INDOT uses eight types of seed mixtures:

- 1) Seed Mixture "R"
- 2) Seed Mixture "U"
- 3) Seed Mixture "P"
- 4) Seed Mixture "CV"
- 5) Seed Mixture "Legume"
- 6) Seed Mixture "D"
- 7) Seed Mixture "T"
- 8) Seed Mixture "Grass"

The letter notation (R,U,P,CV,D,T) indicates the general area where the seed is to be placed.

Seed mixture R is a general purpose seed mixture normally placed in rural areas. The application rate for mixture "R" is 170 pounds per acre. The mixture consists of the following grasses:

- 1) 95 lb of Kentucky 31 Fescue or approved equal
- 2) 65 lb of Perennial Ryegrass
- 3) 10 lb of Jasper Red Fescue or approved equal

Seed mixture U is applied at specific locations normally in urban areas. The application rate is 150 pounds per acre. The mixture consist of the following grasses:

- 1) 95 lb of a 4-way blend of turf type tall fescue
- 2) 20 lb of Jasper Red Fescue or approved equal
- 3) 35 lb Certified fine balded perennial ryegrass such as Regal, Fiesta, Blazer, or approved equal

The application rate for Mixture P is 80 pounds per acre. Mixture P consists of the following grasses:

- 1) 20 lb of Perennial Ryegrass
- 2) 30 lb Fults Puccinella Distans
- 3) 30 lb Jasper Red Fescue

Seed mixture CV consists of Crown Vetch. The application rate is 10 pounds per acre. Crown Vetch is placed at the following locations:

- 1) All slopes 3 to 1 or steeper
- 2) On granular slopes
- 3) On slopes highly susceptible to erosion

Because of the premium price of crown vetch seeding, this seed is used only on selected areas and slopes, sown with a hand type spreader, and placed just prior to placing specified seed mixture.

Seed mixture legume is placed at specific locations noted on the plans. Normally legumes are planted on the original ground behind the backslope. There are two types of legume seed mixture:

- 1) Type 1 is placed at the rate of 190 pounds per acre and consists of:
 - a. 10 lb of Sericea Lespedeza or Korean Lespedeza
 - b. 10 lb of medium Red Clover or Alsike Clover
 - c. the mixture specified for Seed Mixture R.
- 2) Type 2 is placed at the rate of 110 pound per acre and consists of:
 - 1) 10 lb of Sericea Lespedeza or Korean Lespedeza
 - 2) 10 lb of medium Red Clover or Alsike Clover
 - 3) 10 lb of Birdsfoot Trefoil
 - 4) 40 lb of Certified Common Kentucky Bluegrass
 - 5) 30 lb of Creeping Red Fescue
 - 6) 10 lb of Annual Ryegrass

There are a number of other seed mixtures used in special situations such as ditches with chronic saturated soils and temporary cover for disturbed soil. These include Seed Mixture D, Seed Mixture T, Spring Mix and Fall Mix; and Seed Mixture Grass, Types 1 and 2. The technician may refer to Section **621.06** for these mixtures.

SEASONAL LIMITATION

The Contractor is required to post a warranty bond for all permanent seeding done from October 16 through January 31. Only completed seeding with seed mixtures R, U, or P require the warranty bond. Seeding without mulch may not be done between May 1 and August 15.

MULCHING

The next step in the process of seeding, if required, is the placement of a mulching material.

Mulch for seeding may consist of:

- 1) Straw
- 2) Excelsior mulch
- 3) Excelsior blankets
- 4) Paper mat
- 5) Straw mat
- 6) Wood cellulose fiber mulch

Because straw and wood cellulose fiber mulch is the most commonly used, the manufactured mats are discussed further. Sections **621.05** and **914.05(a)** contain requirements for manufactured mats.

Excelsior mulch is wood fibers cut from sound green timber. The fibers are required to have an average length of 4 to 6 in. The cut is at a slight angle to the natural grain, to cause the fibers to splinter. The splintering in turn provides adherence in the fibers and to the soil during weathering.

Wood cellulose fiber mulch is made from wood chip particles. These particles are manufactured such that they may be discharged uniformly. The placement is done by a hydraulic water sprayer. The sprayer is required to agitate the particles to keep the material suspended in the water, thus yielding a uniform cover. The wood cellulose mulch fibers intertwine physically to form a strong moisture holding mat on the ground surface. The wood cellulose mulch is placed at a rate of 1 ton/acre within 24 h after seeding.

PLACEMENT OF MULCH

Mulching material is applied uniformly in a continuous blanket at the rate of 2 tons per acre. Too much mulch is not only wasteful but will retard the growth of the vegetation. Too little mulch does not afford sufficient protective cover for the seed. Mulch is required to be placed within 24 h after seeding. The percent of moisture in the mulch is determined in accordance with Section **621.13(c)**.

Adequate provision for holding the mulching material in place is important. Unless the mulching material is retained, winds or traffic blasts adjacent to the pavement may displace the mulch. The approved methods that give satisfactory results are:

- 1) Punching
- 2) Method A
- 3) Method B
- 4) Method C
- 5) Method D
- 6) Method E

The most common method used is punching. The punching operation partially covers the mulch with soil. The tool used for the punching is required to have:

- 1) Disks that are notched
- 2) Disks with 16 in. minimum diameters
- 3) Disks that are flat or uncupped
- 4) Disks spaced a maximum of 8 in. apart along the axle
- 5) Disks performing longitudinally with the mulch tiller
- 6) Axle sections not exceeding 8 ft in length
- 7) The capabilities to have weight added or hydraulic force pushing the disks into the ground

Methods A, B, C, D, and E, are permitted on slopes steeper than 3 to 1. These methods may also be specified by the contract proposal or the PE/PS.

METHOD A

In Method A the mulch is held in place by use of a mulch binder which is in accordance with all applicable State and Federal regulations and applied according to the manufacturer's instructions. The product contains a coverage indicator to aid in visual inspection for evenness of application. If the mulch fails to stay in place, the Contractor is required to repair all damaged areas.

METHOD B

In Method B, the mulch is held in place by spraying the mulch with a satisfactory liquid asphalt or asphalt emulsion. This material may be applied immediately after the mulch is placed or may be injected into the mulch as the mulch leaves a power driven mulch spreader.

If applied to the mulch surface, the asphalt is applied at a rate of approximately 0.06 gallon per square yard. If applied with the mulch through the spreader, the rate is approximately 60 gallons per 1 ton of mulch. The exact amount is required to be as directed.

METHOD C

Method C utilizes binder twine and wooden pegs to hold the mulch in place. The pegs are required to be not less than 6 in. and spaced 4 ft apart. The twine is placed parallel to the pavement. Additional twine is placed at 60 degrees with the pavement edge in both directions. The diagonal strands are spaced 12 ft center to center along the parallel strands. The next parallel strand is spaced at the intersections of the diagonal strands. This intersection is 12 ft from the previous parallel strand intersection measured along the diagonal strand.

METHOD D

In Method D the mulch is held in place with a polymeric plastic net. During placement the net should:

- 1) Be unrolled such that the mulch lays out flat, evenly and smooth. The mulch is not stretched.
- 2) Be held in place by wire staples, spaced 4 ft apart with alternating spacing
- 3) Be secured at top and bottom of the slope with staples 1 ft on centers
- 4) Be overlapped 4 in. and stapled on the ends and edges
- 5) Be placed with the material length running from top of slope to toe of slope or the length running horizontally or parallel to the contour
- 6) Be stapled 1 ft on center along overlaps parallel to the slope
- 7) Be stapled 3 ft on center along overlaps perpendicular to the slope

METHOD E

For Method E the area is covered with erosion control blankets. The Contractor is permitted to use excelsior blanket, paper mat, or straw mat where mulched seeding or erosion control blanket is specified. Wood cellulose fiber mulch may be used where mulched seeding is specified. Section **621.05** includes information on applying fertilizer, seed and mulch.

ACCEPTANCE OF MATERIALS

Grass seed is required to be received:

- 1) Bagged proportionately. (i.e. seed mixture "R" should come in 42.5 lb bags. Four bags will complete one acre. Seed mixture "U" should come in 50 lb bags. Three bags will complete one acre.)
- 2) Fully tagged. The tag contains the following vital information:
 - a. Mix composition which should match the specifications
 - b. Source of supply. The source of supply is required to have been sampled, tested, and reported by the State Seed Commission.
 - c. An expiration date. Seed beyond the expiration date is not used.
 - d. A laboratory number which is used for the material record

The acceptance of mulch is dependent upon the mulch being used. The following mulches are accepted visually and require a Type C Certification:

- 1) Wood cellulose fiber
- 2) Excelsior blankets
- 3) Paper mats
- 4) Straw mats

All other types of mulching materials are accepted visually.

All mulches are tested to verify the moisture requirements. One test is required for each 20 tons of mulch. Additional tests may be required if visual inspection indicates a significant amount of moisture in the mulch. The results of this test are recorded on form TD 647.

Fertilizer standards are covered by the guidelines of the Indiana State Seed Commission. The technician is only concerned about the analysis of the fertilizer. If fertilizer is bagged, the bag is required to contain the analysis of 12-12-12. The Contractor may use a different analysis with adjustments to the application rates; however the bag is required to contain the analysis (i.e., 8-8-8). If the fertilizer is received in bulk or liquid form, a Type C Certification is the basis for acceptance. A visual inspection is made of the bulk material to assure that the fertilizer has never been extremely wet. This may be detected by many large discolored clumps.

MEASUREMENT OF QUANTITIES

The measurement and payment of seeding items are dependent entirely on the contract proposal. The proposal outlines separate items for seeding, or only one item is listed as “Mulched Seeding, Class____, Type____”.

If seeding is paid by separate bid items, the units normally are as follows:

- | | | |
|----|-------------------|-------|
| 1) | Seed Mixture | Pound |
| 2) | Fertilizer | Ton |
| 3) | Mulching Material | Ton |

If seeding is paid for by separate bid items, the technician is required to verify that the seed is weighed each day and the proper reports are made. Counting sacks of fertilizer used each day then multiplying by the weight of one sack to obtain the daily record of fertilizer is allowed. The price of sodding includes the fertilizer. Accurate records of all fertilizer delivered to the contract is required. The amount of fertilizer used in sodding is required to be determined so that the correct pay quantity for fertilizer may be determined. The amount of fertilizer used in sodding may easily be determined by multiplying the acres of sod by the specified amount of fertilizer per acre.

Mulching material is paid for by the ton; therefore, each truck load is required to be weighed and a weigh ticket made. Representative samples are required to be taken from the mulching material to determine the amount of moisture in the material. This sample is weighed at the time of delivery, then re-weighed when the mulching material is dry to determine the moisture content. To determine the moisture, this sample is placed in a large burlap sack then placed in a suitable location to dry. The number of samples required depends on the total amount of mulching required, weather conditions, and the sources of supply. Moisture content is determined using the formula in Section **621.13(c)**.

If the contract proposal has an item of "mulched seeding", then measurement and payment is different. The item "mulched seeding" includes all ingredients needed to complete the seeding operation. (i.e. the seed, fertilizer, and mulching material.) Mulched seeding is measured and paid for by the square yard.